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ABSTRACT

This study examined the effect of grouping teachers and students by conceptual level (CL) upon the teachers' information handling behavior. Twenty secondary school teachers were divided into two groups of 10 HCL and 10 LCL teachers according to their scores of the Paragraph Completion Test. Forty pairs of sixth graders were formed, each pair matched for IQ but with disparate CL. Information handling behavior of the teachers was identified through the use of the System for Analyzing the Oral Communication of Teachers. Degree of interdependentness was determined by the proportion of statements in the categories "helping students to theorize" and "helping students to express themselves." Results indicated that high CL teachers were significantly more interdependent than low CL teachers, and that significantly more interdependent techniques were used with HCL students than with LCL students. The highest interdependence was observed with the HCL teacher-HCL student treatment. The least interdependence was shown by the LCL teacher-LCL student treatment. HCL teachers were significantly more interdependent with HCL students than with LCL students. The interdependence of the LCL teachers did not vary significantly between LCL or HCL students. Implications for research on teaching are drawn from the student effect on HCL teachers. (RT)

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TEACHERS' INFORMATION HANDLING WHEN GROUPED WITH STUDENTS BY CONCEPTUAL LEVEL

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The purpose of this study was to determine the effect of grouping teachers and students by conceptual level (CL) upon the teachers' information handling behavior.

The research was based upon the theoretical position of Conceptual Systems Theory (Hunt, 1971). Conceptual Systems Theory suggests that generically speaking, one's conceptual capabilities develop from concrete levels of conceptualization to more abstract levels. Low conceptual level (LCL), or "concrete," individuals are theorized to be rigid in their environmental interaction, preferring categorical responses that are dependent upon external normative standards. High conceptual level (HCL) or "abstract," individuals are seen as being more flexible in their environmental interaction, preferring to consider numbers of alternatives and their decision-making is ultimately based upon internal standards. Because the theory is developmental in nature, abstract (HCL) individuals can be expected to behave in more concrete ways if they see the need to do so while concrete (LCL) individuals are not expected to behave in more abstract ways.

Review

Hunt and Joyce (1967) were among the first to apply the framework of Conceptual Systems Theory to the field of education. Their studies indicated there were specific instructional environments generated by teachers of varying conceptual levels. Teachers

of a less conceptual, more concretely oriented system of functioning created a unilateral instructional environment. The low conceptual level (LCL) teacher structured the learning situation in such a way as to inhibit the pupil's formation of alternatives in a problem-solving situation. The situation was typically oversimplified and the pupil learned a response pattern through an adaptive orientation characterized by fixed rules. The student was, in a sense, forced to look to the teacher for direction as to procedural matters in the classroom and conclusions from curricular discussions. Teachers with higher conceptual levels, with a more abstractly oriented system of functioning, created an interdependent instructional environment. The high conceptual level (HCL) teacher structured an instructional setting in which the pupil was provided with information or feedback as a consequence of his exploratory behavior. This information did not provide for externally imposed closure but rather aided the pupil in generating his own schemata for evaluating alternatives within the classroom instructional situation. The pupil was allowed to explore his environment, ask questions, act, and experience the consequences of his decisions. The HCL teacher allowed the pupil to explore what was essentially an autotelic environment.

Other studies utilizing Conceptual Systems Theory have yielded a number of pertinent findings. Cross (1966) related parental training conditions to the CL of the parent's children. He found that parents of HCL boys were more interdependent than parents of LCL boys. Cross concluded that interdependent parental training encouraged development of children's conceptual level to

more abstract levels. Claunch (1964) found no difference between HCL and LCL individuals on multiple choice test items, but found that HCL individuals performed significantly better on more complex essay examinations than did their LCL counterparts. Tuckman (1968) reported that HCL students were less satisfied with direct teachers than LCL students. Tomlinson (1969) showed that HCL students performed significantly better than LCL students in low and moderate structured situations. LCL students did significantly better in a high structure task than in a low structure task.

Our study was based on an extension of the work begun by Hunt and Joyce (1967). Their approach was extended to a more carefully designed teaching situation in which matched and mismatched groups of teachers and students in terms of CL could be observed. Teachers and students were grouped by the same independent variable, conceptual level, and the effect these groupings on the teachers' information handling behavior was observed. The conceptual level of teachers and students was identified through the Paragraph Completion Test (Hunt, 1971). The information handling behavior of the teachers was identified through the use of the information handling categories in the System for Analyzing the Oral Communication of Teachers (Joyce and Harootunian, 1967). The System includes four major categories: sanctions, information handling, procedures, and maintenance. Included under information handling are five categories: helping students to theorize, helping students to express themselves, questioning students for precise answers, delivering information, and giving conclusions. The ratio of the number of statements recorded in the first two categories of the information handling

section to the total number of information handling statements determined the interdependentness of the teaching episode. Thus, the proportion of interdependence in each instructional episode was the dependent variable. A high proportion of interdependentness meant the teacher had let students express themselves, raise questions, and hypothesize answers to problems. A low proportion of interdependentness would mean the teacher had asked precise questions, drawn conclusions for the students, and had given a large amount of information.

The objective of the study was to see if Conceptual Systems Theory could be applied successfully in a teaching-learning context. It was hypothesized that the HCL teachers would be more interdependent than the LCL teachers;more interdependent techniques would be used with HCL students than with LCL students; the proportion of interdependentness would be greater for the HCL teacher - HCL student treatment than for the HCL teacher - LCL student treatment; that there would be no significant difference between the proportion of interdependentness of the LCL teacher - LCL student treatment and the LCL teacher - HCL student treatment; and that the proportion of interdependentness would be greater for the HCL teacher - HCL student treatment than for the LCL teacher - LCL student treatment.

Method

Twenty volunteer teachers from the sixth, seventh, and eighth grades of a middle school formed the teacher sample. A variety of subject area specialties was represented in the teacher sample. A median split was performed on their Paragraph Completion Test scores forming two groups of 10 HCL and 10 LCL teachers. From

an initial pool of 204 sixth graders, 40 pairs were formed, each pair matched for I?Q? but with disparate CL. Each pair was divided forming student groups of 40 HCL and 40 LCL students. Subjects were randomly assigned to treatments in a 2x2 factoral design with HCL and LCL being the independent variable for both teacher and student groups. No student was grouped with a familiar teacher. Each teacher was given a packet of source material on the topic of "Pollution," containing a variety of material appealing to all subject areas. Teachers were told they were to teach a group of 4 students something about pollution. The source material was provided to aid them, but they were not to be limited by it. Their method of teaching was left completely to their own choosing. The actual treatment consisted of each teacher (HCL or LCL) teaching a group of students with similar CL (HCL or LCL) in a spare classroom in the normal school building of the participants. This "mini-teaching" episode was recorded on audio tape and the proportion of interdependentness was computed for each teacher.

The results of the data analysis are given in Table 1. The proportion of interdependence ranged from .059 for the LCL teacher - LCL student treatment to .264 for the HCL teacher - HCL student treatment. An ANOVA using Dunn's Multiple Comparison Technique (Kirk, 1968) was performed on the scores of the 18 available teachers. One HCL teacher and one LCL teacher left the school during the course of the study. The findings can best be understood in terms of the specific hypotheses.

Results

Hypothesis 1. The proportion of interdependentness will be significantly greater for HCL teachers than for the LCL teachers.

Hypothesis 1 was accepted at the .01 level of significance (Table 1). It was theoretically predictable that HCL teachers would be more interdependent than LCL teachers. In addition, this finding confirmed the findings of Hunt and Joyce (1967). The findings gave validity to the operationalization of the concept "interdependentness" as being consistent with the behavior of HCL individuals as predicted by Conceptual Systems Theory.

Hypothesis 2. The proportion of interdependent teacher behavior will be greater for HCL students than for LCL students.

Hypothesis 2 was accepted at the .01 level of significance (Table 1). This significant main effect implied that HCL students had a different kind of effect upon teachers than did LCL students. Accountability for this fact does not lie in IQ because IQ was controlled across CL for the students. Therefore, the students' CL influenced teachers to behave in different ways. HCL students influenced teachers to behave more interdependently than LCL students; that is, they influenced teachers to give less information, ask less precise questions, and draw fewer conclusions. Clearly a student effect was isolated by the confirmation of Hypothesis 2.

Hypothesis 3. The proportion of interdependentness will be significantly greater for the HCL teacher-HCL student treatment than for the LCL teacher-HCL student treatment.

The difference between means of the HCL teacher-HCL student treatment and the LCL teacher-HCL student treatment was significant at the .05 level ($d^{*}=.139$). Cell means are reported in Table 1. The finding implies that with a conceptually similar types of students, LCL teachers handled information differently than HCL

* d is the difference between the means being compared.

teachers: LCL teachers were less interdependent. Theoretically the developmental nature of conceptual systems postulated that LCL teachers would be less interdependent than HCL teachers. The HCL students should have provided a similar amount of "situational pull" for both LCL and HCL teachers. LCL teachers were therefore, in this situation, unable to behave as interdependently.

Hypothesis 4. The proportion of interdependentness will be significantly greater for the HCL teacher - HCL student treatment than for the HCL teacher-LCL student treatment.

The difference between means of the HCL teacher-HCL student treatment and the HCL teacher-LCL student treatment was significant at the .05 level (d=.140). Cell means are reported in Table 1. The finding revealed a difference in the proportion of interdependentness of HCL teachers in teaching students of different conceptual levels. Theoretically, this finding was justifiable. HCL individuals were supposed to have the capacity to function conceptually at less abstract levels because they had developed through those levels. Appropriate "situational press" should have triggered their operation at less abstract levels. The LCL students were an "appropriate situational press" in this case and therefore the HCL teachers teaching LCL students showed a significantly lower proportion of interdependentness than HCL teachers teaching HCL students. This difference was a result of a "student effect;" that is, HCL and LCL students "affected the HCL teachers in different ways."

Hypothesis 5. There will be no significant difference between the proportion of interdependentness for the LCL teacher-LCL student treatment and the LCL teacher-HCL student treatment.

This hypothesis was investigated by comparing the means of

the LCL teacher-LCL student treatment with the means of the LCL teacher-HCL student treatment. The means are reported in Table 1. No significant difference was found (d=.066). The finding is consistent with Conceptual Systems Theory which predicts that LCL individuals are unable to change their style of behavior even under the appropriate situational press.

Hypothesis 6. The proportion of interdependentness will be significantly greater for the HCL teacher-HCL student treatment than for the LCL teacher-LCL student treatment.

This hypothesis was investigated by comparing the means of the HCL teacher-HCL student treatment with the means of the LCL teacher-LCL student treatment. The means, reported in Table 1 were significantly different (.01) (d=.205). This finding is expected because these two extreme groupings should show the greatest differences in interdependentness as predicted by Conceptual Systems Theory. HCL individuals interacting with like individuals should reinforce each other's interdependent behavior as should LCL individuals interacting with each other. The students, in the specific case of this hypothesis, tend to reinforce the natural teaching styles of their teachers and do not affect their behavior in an unnatural direction.

Implications

While the results in Table 1 show significant main effects for the CL of both teachers and students, the most important implication of this study is obtained by looking at the specific cell means. There is no significant interaction effect, yet in a sense the various combinations of teacher and student CL interact,

most notably in the HCL teacher - HCL student and the LCL teacher - LCL student cells. Clearly the cell means in Table 1 indicate that different combinations of teachers and students produce different information handling behavior by teachers, as predicted by Conceptual Systems Theory.

While recent studies of teaching have stressed the influence of teacher behavior on students, our study supports the notion that there is also a "student effect" for the instructional behavior of teachers. Following a Lewinian formulation (Lewin, 1936), B f(P.E.), the Behavior of the teacher (B) is a function of his Personality (P = conceptual level) and his Environment (E = Student conceptual level). Research on teaching should acknowledge this "student effect" as it seems to affect teacher behavior in a rather powerful way. Additionally, conceptual level seems to be variable that has great potential in instructional groupings.

Students as a part of the instructional environment should not be ignored in research on teaching. The teaching process is a process that occurs with students and to neglect students in the study of that process is to ignore a significant variable. Because it was shown that students similarly grouped on at least one variable (CL) have a clear effect for one type of teacher's verbal behavior, the nature of the "student effect," its causes and its parameters, must be considered in research on teaching. Without considering student effect, the reliability of studies involving classroom instruction can be questionable. Perhaps one reason why researchers have rarely found teacher variables that have a significant effect for student learning is that researchers do not make a

practice of having the necessary student control in their research. Cronbach's (1967) Aptitude-Treatment Interaction Model (ATI) was formulated to bring about such control. More recently, Hunt (1971) has reconceptualized the ATI model into a "matching model" by which he sets forth "the principles which specify those approaches most likely to facilitate certain objectives for different kinds of persons." Thus, while CL was the basis for the match in our study, other matches might be based on the motivational, value, or sensory orientations of the individuals in an experiment. The implication of the ATI and matching models for the study of teaching is the establishment of a new set of ground rules. Teaching has to be viewed much more specifically in terms of the kinds of teacher behavior, characteristics, etc., that combine most advantageously with student behavior, characteristics, etc. Such specificity will require a lot of hard work on the part of researchers, but its payoff might be the unravelling of the web of complexities that envelop teaching.

Table 1

Analysis of Variance for Interdependentness

Analysis of Variance

Source	Sum of Squares	Degrees of Freedom	Mean Square	F
Teacher CL	.046	1	.046	12.021**
Student CL	.047	1	.047	12.366**
Interaction	.006	1	.006	1.547
Error	.054	14	.004	

Cell Means

Students	LCL Teacher	HCL Teacher	Total
HCL Student	.126	.264	.203
LCL Student	.059	.124	.096
Total	.093	.195	.149

** $p < .01$

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